

The tube 204 has a length  $L_1$  between the free end 206 and the transition section 219. As the lid 148 is opened, the tube 204 provides a flow resistance along its length  $L_1$  to prevent, or at least minimize, the ingress of fluid from the underside of the body 146.

The surrounding wall structure 210 is sized and located to encourage the formation of a meniscus in an annular volume 221 between the surrounding wall structure 210 and the tube 204. Also, the presence of the surrounding wall structure 210 encourages fluid which is held within the annular volume 221 to drip down the inside of the surrounding wall structure 210 rather than down the outside of the tube 204. This removes some dripping fluid from the vicinity of the tube 204 to further prevent or minimize ingress of the fluid into the tube 204 as the lid opens. The total length of the passage 209 is indicated as  $L_2$  in FIG. 4. The distance from the orifice 160 to the transition section 219 is designated  $L_3$ . The surrounding wall structure 210 has an inside diameter designated  $D_3$ .

According to one embodiment of the invention which is contemplated for use in dispensing yellow mustard, the dimensions are:  $D_1=0.110$  inch,  $D_2=0.187$  inch,  $D_3=0.50$  inch,  $L_1=0.34$  inch,  $L_2=0.50$  inch, and  $L_3=0.097$  inch.

As with the previously described embodiment, the tube 204 and surrounding wall structure 210 can be annular in cross-section or can be oval or another closed geometric shape. Between the skirt 156 and the surrounding wall structure 210 is a plug seal 224 which tightly fits within the container C.

Although no hinge is shown in the embodiment illustrated in FIG. 4, the lid 148 can be connected to the body 146 by a hinge such as shown in FIG. 1, or a tether or other means, or not connected at all.

Although in each illustrated embodiment, the closure is illustrated as having only a single dispensing tube (such as tube 104 in FIG. 3), it will be appreciated that more than one tube may be employed in applications wherein that is desired. For example, it may be desirable to employ three or four relatively small diameter tubes within the larger diameter surrounding wall structure 110 shown in FIG. 3A. This has the advantage of accommodating a desirably large dispensing flow. However, because each individual tube has a relative small cross-section, the tendency of the fluid to free-flow into

[an] and through the small tubes, when the dispensing pressure is removed, will be significantly minimized, if not eliminated.

It will also be appreciated that the tube or tubes need not have a circular cross-sectional configuration. Other suitable cross-sectional configurations may be employed. For example, the tube or tubes may each have a flow passage (e.g., passage 109 in FIG. 3) which has a polygon cross-section. In one contemplated embodiment, the passage may have a rectangular cross-section which is relatively small in one direction (i.e., the width of the rectangle) and relatively large in the other direction (i.e., the length of the rectangle). This would provide a relatively large amount of surface area in the flow passage relative to the cross-sectional flow area. This would tend to prevent the fluid from free-flowing into and/or through the passage when the dispensing pressure is removed.

It will be readily observed from the foregoing detailed description of the invention and from the illustrations thereof that numerous other variations and modifications may be effected without departing from the true spirit and scope of the novel concepts or principles of this invention.

What is claimed is:

1. A spurt-resistant dispensing structure, for dispensing a viscous fluid comprising:

a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of the viscous fluid thereon;

said body including a conduit having a passage in fluid communication with said orifice and extending from an inside surface of said wall portion in a direction away from said spout to a first free end, said passage having a substantially constant open area along a length thereof between said inside surface to said first free end, said passage being free of obstructions, and having a width dimension of about 0.11 inches;

said body including a surrounding wall structure surrounding said conduit and extending from said inside surface of said wall portion; and

a pry-off lid having a collar which seals against an outside of said spout when said lid is mounted on said body.

2. The dispensing structure in accordance with claim 1 wherein said conduit comprises an annular wall having an annular cross-section.

3. The dispensing structure in accordance with claim 1 wherein said wall portion is curved upwardly to said dispensing orifice forming a spout.

4. The dispensing structure in accordance with claim 1 wherein said surrounding wall structure comprises a ring extending from said wall portion to a second free end.

5. The dispensing structure in accordance with claim 1 further comprising a lid sized to fit over said wall portion and close said dispensing orifice when said dispensing structure is not dispensing.

6. The dispensing structure in accordance with claim 1 wherein said surrounding wall structure is surrounded by a seal held within said body and extending from an underside of said wall portion for sealing against a container closed by said dispensing structure.

7. The dispensing structure in accordance with claim 1 wherein said lid is hingedly attached to said body to pivot with respect thereto.

8. The dispensing structure in accordance with claim 1

wherein

said conduit has a first diameter and extends a first distance from said wall portion to said conduit first free end;

said surrounding wall structure has a second diameter; and

and said first diameter, said second diameter, and said first distance are relatively sized as a function of the viscosity of a fluid to be dispensed by said dispensing structure such that the fluid forms an annular meniscus having an outer edge on said surrounding wall structure and having an inner edge on said conduit.

9. The dispensing structure in accordance with claim 1 wherein said body is a unitary molded element separate from, but attachable to, a container.

10. The dispensing structure in accordance with claim 1 wherein said surrounding wall structure extends downwardly from said wall portion to a second free end thereof, said second free end located at a greater distance from said dispensing orifice than is said first free end.

11. The dispensing structure in accordance with claim 1 further comprising a sealing lip which has a generally

tapered profile extending from said wall portion of said body, which surrounds said surrounding wall structure, and which is sized and arranged to seal a container fit into said body.

12. The dispensing structure in accordance with claim 1 wherein said body includes a depending skirt having a thread on an inside of said skirt for engaging a cooperating thread on a container.

13. A spurt-resistant dispensing structure comprising:

a body having a deck portion and a depending skirt portion, said deck portion extending radially inwardly from an edge region of said skirt portion, said body having a spout extending upwardly [from]

relative to said skirt portion, and said spout having an outer end defining a dispensing orifice;

said body including a tubular portion extending from an inside surface of said deck portion in a direction away from said spout to a first free end and having a passage establishing fluid communication between said dispensing orifice and the interior of said skirt portion;

said body including a surrounding ring portion extending from an inside surface of said deck portion to a second free end and surrounding said tubular portion;

said tubular portion, said deck portion, and said surrounding ring portion together defining an annular recess for holding fluid therein; and

a pry-off lid connected to said body, said lid being movable between (1) a closed position to engage said body, said lid having an annular collar arranged to seal around an outside of said spout to close said dispensing orifice of said spout when said lid is mounted on said body, and (2) a pried-off open position permitting dispensing of fluid out of said dispensing orifice.

14. The dispensing structure in accordance with claim 13 wherein said lid comprises:

(a) an inner seal sized to sealingly engage said spout; and  
(b) a first surrounding wall sized to engage said body radially outwardly of said inner seal.

15. The dispensing structure in accordance with claim 13 wherein said first free end of said tubular portion is recessed

toward said deck portion relative to said second free end of said surrounding ring portion.

16. The dispensing structure in accordance with claim 15 wherein said surrounding ring portion has a preselected diameter to hold a volume of fluid which forms an annular meniscus between said surrounding ring portion and said tubular portion, and said first free end of said tubular portion extends past said meniscus such that said tubular portion passage is free of said fluid.

17. The dispensing structure in accordance with claim 13 in which said body includes a plurality of said tubular portions.

18. A spurt-resistant dispensing structure, for dispensing a viscous fluid comprising:

a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said

body, said wall portion having an inside surface for forming a meniscus of the viscous fluid thereon;

said body including a conduit having a passage in fluid communication with said orifice and extending from an inside surface of said wall portion in a direction away from said spout to a first free end, said passage having a substantially constant open area along a length thereof between said inside surface to said first free end, said passage being free of obstructions; and

a pry-off lid having a lid portion which seals against an outside of said spout when said lid is mounted on said body, said open area sized to resist flow of the viscous fluid therein when said lid is pried off of said

[the] body.

19. The dispensing structure in accordance with claim 18 wherein said open area is defined by a circle having a diameter of about 0.11 inches.

20. The dispensing structure in accordance with claim 19 wherein said conduit has a length between said inside surface and said first free end equal to about 0.34 inches.

21. The dispensing structure in accordance with claim 18 wherein said structure includes a seal bead on said lid portion to seal against said spout.

22. A spurt-resistant dispensing structure, for dispensing a viscous fluid comprising:

a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of the viscous fluid thereon; and

said body including a conduit having a cylindrical conduit passage of constant open area in fluid communication with said spout, said conduit extending from an inside surface of said wall portion to a first free end, said conduit having a length such that said first free end is located beyond the meniscus; and

a pry-off lid having a lid portion which seals against an outside of said spout when said lid is mounted on said body, said open area sized to resist flow of the viscous fluid therein when said lid is pried off of said

[the] body.

23. The dispensing structure in accordance with claim 22 wherein said spout has an exterior surface and said lid portion comprises a collar sized to sealingly engage said spout exterior surface.

24. The dispensing structure in accordance with claim 22 wherein said open area is defined by a circle having a diameter of about 0.11 inches.

25. The dispensing structure in accordance with claim 24 wherein said conduit has a length between said inside surface and said first free end equal to about 0.34 inches.

26. The dispensing structure in accordance with claim 22 wherein said spout includes a cylindrical spout passage terminating at said orifice and arranged colinearly with, and communicating with, said cylindrical conduit passage, said cylindrical spout passage being greater in diameter than said cylindrical conduit passage.

27. A spurt-resistant dispensing structure for dispensing a viscous fluid, comprising:

a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of fluid thereon;

said body including a conduit having a conduit passage in fluid communication with said orifice and extending from an inside surface of said wall portion in a direction away from said spout to a first free end, said passage having a substantially constant open area along a length thereof from said inside surface to said first free end, said passage being free of obstructions; and

a pry-off lid having a lid portion which seals against said spout when said lid is mounted on said body, said open area sized to resist flow of the viscous fluid therein when said lid is pried off of said body.

28. The dispensing structure in accordance with claim 27, wherein said open area is defined by a circle having a diameter of about 0.1 inches.

29. The dispensing structure in accordance with claim 27, wherein said conduit has a length between said inside surface and said first free end that is at least about 0.3 inches.

30. The dispensing structure in accordance with claim 27, wherein said structure includes a seal bead on said lid portion to seal against said spout.

31. The dispensing structure in accordance with claim 27, further comprising:

5 a squeezable container resiliently compressible to dispense viscous fluid, said container engaged to said body and in fluid communication with said conduit; and

a supply of viscous fluid contained by said container.

10 32. The dispensing structure in accordance with claim 27, wherein said spout has an exterior surface and said lid portion comprises a collar sized to sealingly engage said spout exterior surface.

15 33. The dispensing structure in accordance with claim 27, wherein said spout has an elongated tapered profile, tapered in a direction toward said dispensing orifice.

20 34. The dispensing structure in accordance with claim 27, wherein said spout includes a cylindrical spout passage terminating at said orifice and arranged colinearly with, and communicating with, said conduit passage, said cylindrical spout passage being greater in cross-sectional area than said conduit passage.

25 35. The dispensing structure in accordance with claim 27, in which said spout includes a plurality of further dispensing orifices and said body includes a plurality of further conduits each having a conduit passage in fluid communication with one of said further dispensing orifices, said further conduits extending from said inside surface of said wall portion in the direction away from said spout to said free end.

36. The dispensing structure in accordance with claim 27, wherein said meniscus-forming inside surface is concave and has a depth of at least about 0.3 inches.

37. A spurt-resistant dispensing structure for dispensing a viscous fluid, comprising:

a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of fluid thereon;

said body including a conduit having a passage in fluid communication with said orifice and extending from an inside surface of said wall portion in a direction away from said spout to a first free end, said passage having a substantially constant open area along a length thereof from said inside surface to said first free end, said passage being free of obstructions; and

a pry-off lid having a lid portion which seals in surface-to-surface contact against said spout when said lid is mounted on said body, said open area sized to resist flow of the viscous fluid therein when said lid is pried off of said body, said body defining a liquid holding volume around an outside of said conduit, said conduit having a length of at least about 0.3 inches between said inside surface of said body wall portion and said conduit first free end.

38. A spurt-resistant dispensing structure for dispensing a viscous fluid, comprising:

a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of fluid thereon; and

said body including a conduit having a cylindrical conduit passage of constant open area in fluid communication with said spout, said conduit extending from an inside surface of said wall portion to a first free end, said conduit having a length such that said first free end is located beyond the meniscus; and

a pry-off lid having a lid portion which seals against said spout when said lid is mounted on said body, said open area sized to resist flow of the viscous fluid therein when said lid is pried off of said body.

5            39. The dispensing structure in accordance with claim 38, wherein said spout has an exterior surface and said lid portion comprises a collar sized to sealingly engage said spout exterior surface.

10           40. The dispensing structure in accordance with claim 38, wherein said open area is defined by a circle having a diameter of about 0.1 inches.

15           41. The dispensing structure in accordance with claim 38, wherein said conduit has a length between said inside surface and said first free end is at least about 0.3 inches.

20           42. The dispensing structure in accordance with claim 38, wherein said spout includes a cylindrical spout passage terminating at said orifice and arranged colinearly with, and communicating with, said cylindrical conduit passage, said cylindrical spout passage being greater in diameter than said cylindrical conduit passage.

43. The dispensing structure in accordance with claim 38, further comprising:

25           a squeezable container resiliently compressible to dispense viscous fluid, said container engaged to said body and in fluid communication with said conduit; and

a supply of viscous fluid contained by said container.

44. The dispensing structure in accordance with claim 38, wherein said spout has an elongated tapered profile, tapered in a direction toward said dispensing orifice.

5 45. The dispensing structure in accordance with claim 38, in which said spout includes a plurality of further dispensing orifices and said body includes a plurality of further conduits each having a conduit passage in fluid communication with one of said further dispensing orifices, said further conduits extending from said inside surface of said wall portion in the direction away from said spout to said free end.

10 46. The dispensing structure in accordance with claim 38, wherein said meniscus forming surface is concave and has a depth of at least about 0.3 inches.

15 47. A spurt-resistant dispensing structure comprising:  
a body having a deck portion and a depending skirt portion, said deck portion extending radially inwardly from an edge region of said skirt portion, said body having a spout extending upwardly relative to said skirt portion, and said spout having an outer end defining a dispensing orifice;

20 said body including a tubular portion extending from an inside surface of said deck portion in a direction away from said spout to a first free end and having a passage establishing fluid communication between said dispensing orifice and the interior of said skirt portion;

said body including a surrounding ring portion extending from an inside surface of said deck portion to a second free end and surrounding said tubular portion;

25 said tubular portion, said deck portion, and said surrounding ring portion together defining an annular recess for holding fluid therein;

a pry-off lid connected to said body, said lid being movable between (1) a closed position to engage said body, said lid having an element arranged to seal said spout to close said dispensing orifice of said spout when said lid is mounted on said

body, and (2) a pried-off open position permitting dispensing of fluid out of said dispensing orifice; and

wherein first free end of said tubular portion and said second free end of said surrounding ring portion are substantially coplanar.

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48. The dispensing structure in accordance with claim 47, wherein said element comprises an annular collar arranged to seal around an outside of said spout.

10 49. The dispensing structure in accordance with claim 47, wherein said spout has an elongated tapered profile, tapered in a direction toward said dispensing orifice.

15 50. The dispensing structure in accordance with claim 47, wherein said lid comprises:

(a) an inner seal sized to sealingly engage said spout; and

(b) a first surrounding wall sized to engage said body radially outwardly of said inner seal.

20 51. The dispensing structure in accordance with claim 47, wherein said surrounding ring portion has a preselected diameter to hold a volume of fluid which forms an annular meniscus between said surrounding ring portion and said tubular portion, and said first free end of said tubular portion extends past said meniscus such that said tubular portion passage is free of fluid.

25 52. The dispensing structure in accordance with claim 47, in which said body includes a plurality of further tubular portions and corresponding further dispensing orifices, arranged as said tubular portion and said dispensing orifice.



53. The dispensing structure in accordance with claim 47, further comprising:

a squeezable container resiliently compressible to dispense viscous fluid, said container engaged to said body and in fluid communication with said tubular portion; and

a supply of viscous fluid contained by said container.

54. The dispensing structure in accordance with claim 47, wherein said annular recess has a depth of at least about 0.3 inches.

55. A spurt-resistant dispensing structure, comprising:

a body having a deck portion and a depending skirt portion, said deck portion extending radially inwardly from an edge region of said skirt portion, said body having a spout extending upwardly relative to said skirt portion, and said spout having an outer end defining a dispensing orifice;

said body including a tubular portion extending from an inside surface of said deck portion in a direction away from said spout to a first free end and having a passage establishing fluid communication between said dispensing orifice and the interior of said skirt portion;

said body including a surrounding ring portion extending from an inside surface of said deck portion to a second free end and surrounding said tubular portion;

said tubular portion, said deck portion, and said surrounding ring portion together defining an annular recess for holding fluid therein;

a pry-off lid connected to said body, said lid being movable between (1) a closed position to engage said body, said lid having an element arranged to seal said spout to close said dispensing orifice of said spout when said lid is mounted on said body, and (2) a pried-off open position permitting dispensing of fluid out of said dispensing orifice; and

wherein the ratio of the inside diameter of said first free end of said tubular portion to the inside diameter of said second free end of said surrounding ring portion is about 0.2.

5            56.    The dispensing structure in accordance with claim 55, wherein said element comprises an annular collar arranged to seal around an outside of said spout.

10           57.    The dispensing structure in accordance with claim 55, wherein said spout has an elongated tapered profile, tapered in a direction toward said dispensing orifice.

15           58.    The dispensing structure in accordance with claim 55, wherein said lid comprises:  
(a) an inner seal sized to sealingly engage said spout; and  
(b) a first surrounding wall sized to engage said body radially outwardly of said inner seal.

20           59.    The dispensing structure in accordance with claim 55, wherein said first free end of said tubular portion is recessed toward said deck portion relative to said second free end of said surrounding ring portion.

25           60.    The dispensing structure in accordance with claim 55, wherein said surrounding ring portion has a preselected diameter to hold a volume of fluid which forms an annular meniscus between said surrounding ring portion and said tubular portion, and said first free end of said tubular portion extends past said meniscus such that said tubular portion passage is free of fluid.

61. The dispensing structure in accordance with claim 55, in which said body includes a plurality of further tubular portions and corresponding further dispensing orifices, arranged as said tubular portion and said dispensing orifice.

5 62. The dispensing structure in accordance with claim 55, further comprising:  
a squeezable container resiliently compressible to dispense viscous fluid, said container engaged to said body and in fluid communication with said tubular portion; and  
10 a supply of viscous fluid contained by said container.

63. The dispensing structure in accordance with claim 55, wherein said annular recess has a depth of at least about 0.3 inches.

15 64. The dispensing structure in accordance with claim 55, wherein said surrounding ring portion has an inside diameter of about 0.5 inches.

20 65. The dispensing structure in accordance with claim 55, wherein said surrounding ring portion has an inside diameter of about 0.5 inches and said tubular portion has a length of at least about 0.3 inches.

66. A spurt-resistant dispensing structure, for dispensing a viscous fluid comprising:  
a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of fluid thereon;  
25 said body including a conduit having a passage in fluid communication with said orifice and extending from an inside surface of said wall portion in a direction

away from said spout to a first free end, said passage having a substantially constant open area along a length thereof from said inside surface to said first free end, said passage being free of obstructions; and

5        a lid having a lid portion which seals in surface-to-surface contact against said spout when said lid is mounted on said body, wherein said conduit has a length of  $L_1$  and an inside diameter of  $D_1$ , wherein the ratio of  $D_1$  to  $L_1$  is about 0.3.

10        67. The dispensing structure in accordance with claim 66, wherein said meniscus forming surface is concave and has a depth of at least about 0.3 inches.

68. The dispensing structure in accordance with claim 66, wherein said open area is defined by a circle having a diameter of about 0.1 inches.

15        69. The dispensing structure in accordance with claim 66, further comprising:

a squeezable container resiliently compressible to dispense viscous fluid, said container engaged to said body and in fluid communication with said conduit; and

a supply of viscous fluid contained by said container.

20        70. The dispensing structure in accordance with claim 66, wherein said spout has an elongated tapered profile, tapered in a direction toward said dispensing orifice.

25        71. A dispensing structure, for dispensing a viscous fluid comprising:  
      a body for extending from a container substantially closing an opening thereof, said body having a wall portion with a spout having a dispensing orifice therethrough for dispensing fluid at least partially contained by said body, said wall portion having an inside surface for forming a meniscus of fluid thereon;

said body including a conduit having a passage in fluid communication with said orifice and extending from an inside surface of said wall portion in a direction away from said spout to a first free end, said passage having a substantially constant open area along a length thereof from said inside surface to said first free end, said passage being free of obstructions; and

a lid having a lid portion which seals in surface-to-surface contact against said spout when said lid is mounted on said body, wherein said conduit has a length of at least about 0.3 inches.

72. The dispensing structure in accordance with claim 71 wherein said open area is defined by a circle having a diameter of about 0.1 inches.

73. The dispensing structure in accordance with claim 71, further comprising:  
a squeezable container resiliently compressible to dispense viscous fluid, said container engaged to said body and in fluid communication with said conduit; and  
a supply of viscous fluid contained by said container.

74. The dispensing structure in accordance with claim 71, wherein said spout has an elongated tapered profile, tapered in a direction toward said dispensing orifice.